

# THE MINERAL INDUSTRIES OF DJIBOUTI, ERITREA, ETHIOPIA, AND SOMALIA

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## DJIBOUTI

In recent years, Djibouti, which is a small East African country located at the southern end of the Red Sea, has produced small quantities of clays, granite, limestone, marble, salt, and sand and gravel. Other mineral occurrences of potential economic interest included diatomite, geothermal fluids and mineral salts, gold, gypsum, perlite, petroleum, and pumice.

In 2003, Djibouti's gross domestic product (GDP) amounted to about \$1.4 billion at purchasing power parity. Djibouti's GDP increased by 3.5% in 2003 after rising by 2.6% in 2002, 1.9% in 2001, and 0.7% in 2000. In 2002 (the latest year for which data were available), construction and public works accounted for 6% of the GDP; electricity and water, 5%; and manufacturing and mining, 3% (Banque Centrale de Djibouti, undated; International Monetary Fund, 2004, p. 194; 2004<sup>1</sup>).

According to forecasts by the International Cement Review (2003), Djibouti's cement consumption would remain unchanged at 80,000 metric tons (t) in 2003. The country had no domestic cement production; most imports came from countries in the Persian Gulf. Djibouti also served as a transshipment center for cement destined for Ethiopia.

Salt production started on a semi-industrial scale at Lake Assal in 1998. Production was 162,266 t in 2002 compared with 173,099 t in 2001 and 91,000 t in 1998. The increase in production since 1998 was attributable to rising demand from Ethiopia; Eritrea had been Ethiopia's principal supplier of salt prior to the war between these two countries that lasted from 1998 to 2000. From 1998 to 2002, the number of companies mining salt at Lake Assal increased from 4 to 12. Société d'Exploitation du Lac and Société d'Exploitation du Sel de Djibouti were the largest producers with a combined market share of about 80%. Salt mining has led to environmental problems near Lake Assal (Banque Centrale de Djibouti, undated, p. 14).

Djibouti did not have production facilities for petroleum products; all petroleum demand was met through imports. In 2002, state-owned Electricity of Djibouti (EdD) produced 246.7 gigawatthours (GWh) from four diesel-fired powerplants compared with 235.3 GWh in 2001 and 135 GWh in 1998. From 1998 to 2002, total consumption of electricity increased to 201.5 GWh from 123.7 GWh. During the same period, industrial consumption rose to 106.7 GWh from 61.2 GWh (Banque Centrale de Djibouti, undated, p. 14).

National resources of geothermal energy have been estimated to be between 230 and 860 megawatts (MW). Geothermal areas include Arta, Assal, Bock, Dorra, Gaggade plain, Hanle plain, Lake Abbe area, and Tadjourah. The Government planned to develop the 30-MW Assal geothermal project (Business Council for Sustainable Energy, 2003, p. 47-49).

The outlook for Djibouti's mineral industry is for little growth in the short run; constraints include small domestic markets, minimal known natural resources, and modest GDP growth. According to predictions by the International Monetary Fund (2004, p. 194), GDP would increase by 4.1% in 2004 and 4.6% in 2005.

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## ERITREA

In recent years, the East African country of Eritrea, which became independent from Ethiopia in 1993, has produced a variety of minerals, rock products, and semimanufactured goods. These included basalt, cement, common clay, coral, gold, granite, gravel, gypsum, kaolin, lime, limestone, marble, pumice, quartz, salt, sand, and silica sand. The country also has deposits of such metals as

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<sup>1</sup> References that include a section mark (§) are found in the Internet References Cited sections.

chromium, copper, iron, lead, magnesium, nickel, silver, and zinc, and such industrial minerals as barite, feldspar, and potash (tables 1, 3).

In 2003, Eritrea's GDP was about \$4.3 billion at purchasing power parity. Eritrea's GDP increased by 4% in 2003 after rising by 1% in 2002 and 10.2% in 2001. In 2002, the building and construction sector accounted for 9% of the GDP; manufacturing, 9%; electricity and water, 1%; and mining and quarrying, less than 1% (International Monetary Fund, 2003, p. 79; 2004, p. 194; 2004\$).

## Commodity Review

### *Metals*

Sub-Sahara Resources NL of Australia held the Adi Nefas, Adi Rassi, Debarwa, and Medrizien exploration licenses near Asmara. In 2003, Sub-Sahara and its joint-venture partner Sunridge Gold Corp. of Canada conducted exploration at the Adi Nefas Doop gold deposit in the Adi Nefas License and the Adi Nefas deposit in the Medrizien License. The companies also conducted ground magnetic surveys at the Adi Abeito, Deki Peteros, Emba Derho SE, and Jeremy prospects in the Medrizien License and airborne surveys of the Adi Rassi License (Sub-Sahara Resources NL, 2004).

In February 2003, Sub-Sahara signed a joint-venture agreement with Dragon Mining NL of Australia for the Zara project in northwestern Eritrea. Sub-Sahara and Dragon carried out a sampling program at the Debre Keih, Debre Tsacda, Fah, Koka, and Konate prospects (Ogbazghi, 2003; Sub-Sahara Resources NL, 2004).

Nevsun Resources Ltd. held the Bisha and Okreb properties, which were located to the west of Asmara. In March 2003, the Government granted Nevsun the Augaro property in western Eritrea and additional land near the Bisha and Okreb properties. In 2003, the company spent \$5 million on exploration at Bisha compared with \$160,000 in 2002. Nevsun also spent \$233,000 on exploration at Akurdet and Augaro in 2003. In 2004, the company planned further exploration at Bisha and other properties (Ogbazghi, 2003; Nevsun Resources Ltd., 2004a, b).

Sanu Resources Inc. of Canada held the Dieba River, Fanco, Guluj, and Kerkebet River exploration licenses in Western Eritrea. In 2003, Sanu was awarded the Hurum, Kerkebet West, Lokage, and Mogoraib River prospecting licenses, which were adjacent to its other properties.

In November 2003, Minieres du Nord (MDN) announced that it was in the process of acquiring a 75% interest in Eritrean Minerals Corp., which held the Harab Suit, Matite, Seroa, and Seroa Hill exploration licenses. MDN planned further gold exploration at these properties, which were located in northern Eritrea (Minieres du Nord, 2003).

### *Industrial Minerals*

**Cement.**—According to forecasts by the International Cement Review (2003), Eritrea's consumption of cement would rise to 200,000 t in 2003 from 170,000 t in 2002 and 150,000 t in 2001 because of higher demand for use in housing and roads and other infrastructure. Eritrea Cement Works produced less than one-third of domestic cement requirements; the majority of Eritrea's cement was imported from Jordan.

**Clay.**—In 2002 (the latest year for which data were available), production of common clay fell to 225,504 t from 282,518 t in 2001 (table 1). About 25.6 million bricks were produced in 2002 compared with 21.7 million in 2001; the value of brick production was \$1 million in 2002. Eritrea also produced small amounts of kaolin (Alem Kibreab, Director, Eritrea General Mines Department, written commun., July 10, 2003).

**Stone, Crushed and Dimension.**—Eritrea produced basalt, granite, marble, and pumice for the construction industry. The value of gravel produced in 2002 amounted to \$565,000; sand, \$459,000; marble, \$323,000; basalt, \$102,000; and granite, \$82,000 (Alem Kibreab, Director, Eritrea General Mines Department, written commun., July 10, 2003).

### *Mineral Fuels*

**Petroleum.**—Since the closure of the Assab Oil Refinery in 1997, all of Eritrea's demand for refined petroleum products has been met through imports. In 2002, imports of refined petroleum products amounted to \$48.5 million, which was 9% of total imports. Perenco S.A. held an exploration license for the Defnin Block in northeastern Eritrea (Business Council for Sustainable Energy, 2003, p. 79; International Monetary Fund, 2003, p. 107).

### *Infrastructure*

The state-owned Eritrean Electricity Authority (EEA) was responsible for the generation, transmission, and distribution of electricity. National capacity for generating electricity amounted to 156 MW, all of which was thermal. EEA owned and operated numerous power stations, which included the Hirgigo plant near Massawa with a capacity of 88 MW and the Beleza plant with a capacity of nearly 34 MW. Hirgigo was badly damaged in the war with Ethiopia; repairs to the plant were completed in March 2003. After the restoration of the Hirgigo plant, Eritrea produced more power than it consumed. The World Bank was preparing plans for a \$44 million project to rehabilitate Eritrea's power grid in 2004 and to increase domestic consumption of electricity (Africa Energy Intelligence, 2003a, b; Business Council for Sustainable Energy, 2003, p. 90).

Eritrea's transportation network comprised about 4,000 km of roads, of which nearly 900 km was paved. The railway that linked Ak'ordat and Asmara with the Port of Massawa was 317 km. Rehabilitation of the railway was completed in early 2003, but it was used only for chartered passenger transport. Ports and harbors were Assab and Massawa.

## Outlook

The outlook for Eritrea's mineral industry is for little change in the short run. Demand for such construction materials as basalt, granite, gravel, limestone, marble, and sand depends upon the strength of the domestic economy. Development of unexploited metals deposits depends upon favorable global market conditions, the continuation of peace with Ethiopia, and land-mine clearing. According to predictions by the International Monetary Fund (2004, p. 194), the GDP would increase by 2% in 2004 and 1.7% in 2005.

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## ETHIOPIA

Ethiopia has been a producer of gold, silver, and tantalite, and such industrial minerals as brick clay, diatomite, feldspar, gemstones, granite, gypsum and anhydrite, kaolin, limestone, pumice, salt, sand, scoria, soda ash, and talc. The country also produced cement, lime, lignite, and steel (table 1). Ethiopia's main mineral export was gold. Other metal deposits include iron ore, manganese, nickel, and platinum. Other industrial mineral deposits include apatite, bentonite, dolomite, potash, quartz, and sulfur.

In 2003, Ethiopia's GDP amounted to about \$46.8 billion at purchasing power parity. The GDP contracted by 3.8% in 2003 after growing by 1.2% in 2002, 7.7% in 2001, and 5.4% in 2000 (International Monetary Fund, 2004, p. 194; 2004\$).

## Commodity Review

### Metals

**Columbium (Niobium) and Tantalum.**—Ethiopian Mineral Resources Development Enterprise (EMRDE) operated the Kenticha open pit columbium (niobium) and tantalum mine near Borena. In 2002, exports of columbium (niobium) and tantalum concentrates were 81 t at a value of \$4.89 million compared with 40 t at a value of \$10 million in 2001. Concentrates of columbium (niobium) and tantalum accounted for 1% of total exports in 2002 (Ethiopian Business Development Services Network, 2004, p. 21).

**Gold.**—The Ethiopian investment company Midroc Gold (a subsidiary of Midroc Ethiopia Group) operated the Lega Dembi gold mine in southern Ethiopia, which had a production capacity of 4,000 kilograms per year of gold. Other gold mines that operated in Ethiopia included the Adola and Sakaro, which were also in the southern part of the country. In 2002, exports of gold amounted to about 5,000 kilograms at a value of \$38 million, or 8% of total exports (Ethiopian Business Development Services Network, 2004, p. 20-21).

Between 10% and 20% of Ethiopia's gold production was used in the production of traditional ornaments. Import competition has posed a serious challenge to domestic manufacturers of ornaments in recent years (Gebre-Selassie, 2003).

Midroc explored for gold and base metals in Tigray in northern Ethiopia. Sheba Exploration Ltd. explored for gold at Mereto in the Tigray goldfield. In June 2003, Sheba signed a farm-in agreement with Ezana Mining Development plc of Ethiopia for the Ashanti concession, which was adjacent to Mereto. In December 2003, Ethno suspended its gold exploration activities in the Akobo Basin because of the deteriorating security conditions. The company was owned by Norex Mining and Energy of Norway (75%); Afreds Minerals Water and Energy Development plc of Ethiopia and Geodev Mineral and Water Resources Development plc of Ethiopia, (25%) (African Mining, 2003; Gebre-Selassie, 2003; Africa Mining Intelligence, 2004).

**Platinum-Group Metals.**—Golden Prospect plc held the Delati, Tulu-Dimtu, and Yubdo properties in western Ethiopia. In September 2003, Jubilee Platinum plc announced that it did not plan to exercise its option to form a joint venture with Golden Prospect on these properties (Jubilee Platinum plc, 2003).

**Steel.**—The state-owned Zuqula Steel Rolling Mill Enterprise produced rebar and other semimanufactured steel by using imported billet. Ethiopian Iron and Steel Factory melted steel scrap in an electric-arc furnace for use in producing rebar. The company also consumed imported billet. Akaki Metal Products Factory produced galvanized steel sheets. A galvanized steel plant with a capacity of 40,000 t/yr was expected to be commissioned by Shebel Pvt. Ltd. Co. in October 2003. The Alam Group planned to start production at its 40,000-t/yr galvanized steel plant in January or February 2004 (Glasson, 2003).

### *Industrial Minerals*

**Cement.**—Ethiopia had four cement plants with a combined capacity of nearly 1.52 million metric tons per year (Mt/yr) of cement and 1.36 Mt/yr of clinker. According to forecasts by the International Cement Review (2003), national cement consumption would rise to 1.1 Mt in 2003 from 1 Mt in 2002 and 900,000 t in 2001. Higher production and consumption of cement was attributable to the construction of new roads and hydroelectric dams. Mugher Cement Enterprise planned to build two new cement factories at Dire Dawa in eastern Ethiopia and Mugher near Addas Ababa at a cost of about \$350 million (Abate, 2003).

**Clay.**—EMRDE operated a small kaolin mine at Bamba Wuha; domestic consumers of kaolin included Melkasa Aluminum Sulfate and Sulfuric Acid Factory, Nazret Aluminum Sulfate Industries, and Tabor Ceramics Factory. Mugher Cement planned to build a factory to produce bricks and clay roof tiles in Alemgena at a cost of about \$15 million. If Mugher Cement obtained financing for the project, then the factory could be built in 18 months. The company held a mining license for the necessary raw materials (Ethiopia Ministry of Mines, 2002, p. 8, 10, 14; Abate, 2003).

**Salt.**—In northwestern Ethiopia, artisanal miners produced rock salt in the Denkali depression. Salt was also produced from brine lakes in the areas of Afdera, Assal, and Badda in the Denkali depression and from ponds at Emi and Krime in southern Ethiopia. Salt resources at Lake Afdera were estimated to be 290 Mt (Ethiopia Ministry of Mines, 2002, p. 7, 13).

As of October 2003, Ertale plc was the only company engaged in large-scale salt production at Lake Afdera. A joint venture between Ethiopian Mineral Development Share Company (60%) and Ezana Company (40%) was expected to produce 80,000 t/yr of salt starting in 2004. After this initial phase, production was expected to rise to the full capacity of 250,000 t/yr. The companies planned to supply salt for food and leather and tannery factories (Geda, 2003).

Afar Salt Production-Sharing Co. planned to produce 500,000 t/yr of edible table salt from the brine of Lake Afdera. The company planned to raise production to 3 million metric tons per year; total investment in the project could be nearly \$12 million. Afdera plc planned to produce 100,000 t/yr of salt. Bashanfer Trading plc also held a production license for salt in the Lake Afdera area. Ethiopia was expected to be a net exporter of salt by 2005 (Gebre-Selassie, 2003).

**Stone, Dimension.**—Ethiopia had at least 34 deposits of dimension stone, 10 operating quarries, and 4 processing plants. National Mining Corp. (NMC) (a subsidiary of Midroc Ethiopia) produced amphibolite, granite, limestone, and marble. Saba Stones and Ethiopian Marble Industry also produced marble. In 2002, exports of marble increased to 694 t at a value of \$270,000 from 593 t at a value of \$239,000 in 2001 (Mining Journal, 2002; Ethiopian Business Development Services Network, 2004, p. 21).

### *Mineral Fuels*

**Natural Gas.**—The Gasoil Ethiopia Project was a joint venture to develop the Calub and Hilala gasfields for use in a gas-to-liquid plant in Awash. The project also involved the construction of an ammonia and urea plant and a gas-fired powerplant. Financing problems have inhibited development; the project had an estimated cost of \$1.5 billion. In 2003, the Government signed a memorandum of understanding with Si Tech International of Jordan after terminating negotiations with Sicom Inc. of the United States and the Russian state-owned companies Methanol and Stroytransgas (Africa Energy Intelligence, 2003b).

**Petroleum.**—At the end of 2003, Ethiopia was totally dependent upon imports to meet its demand for petroleum. In fiscal year 2002-03, Ethiopia imported 9.35 million barrels (Mbbbl) of refined petroleum products, which was an increase from 8.53 Mbbbl in fiscal year 2001-02. The value of imported refined petroleum products amounted to \$285 million in fiscal year 2002-03 compared with \$265 million in fiscal year 2001-02. Refined petroleum products accounted for 15% of total imports (National Bank of Ethiopia, 2003a§, b§).

In 2003, Petronas Carigali Overseas Shd. Bhd. of Malaysia signed a production-sharing agreement with the Government for Block G in the Melut Basin. Petronas also signed an agreement with the Government to conduct seismic surveys in the Ogaden Basin (Africa Energy Intelligence, 2003c).

### *Infrastructure*

In fiscal year 2002-03, Ethiopia produced 2,048 GWh of electricity compared with 1,993 GWh in fiscal year 2001-02 and 1,812 GWh in fiscal year 2000-01. Hydroelectric sources accounted for 98% of power generated, and thermal sources, 2%. Most of the country's electricity was produced by the state-owned Ethiopian Electric Power Corp. (EEPCO) (National Bank of Ethiopia, 2003b§).

In 2003, EEPCO's generating capacity rose to 654 MW from 470 MW in 2002 with the commissioning of the Gilgel Gibe dam. EEPCO planned to increase its capacity to 1,330 MW by 2025; new projects included the Tekeze and Gojeb hydroelectric plants with

capacities of 300 MW and 150 MW, respectively. Tekeze was to be built by China National Water Resources and Hydropower Engineering Corp., and Gojeb, by the Midroc Ethiopia Group (Africa Energy Intelligence, 2002, 2003a).

Demand was expected to exceed supply by 2010; demand was expected to reach 2,335 MW of capacity in 2025. To alleviate the large and growing shortages in the future, EEPKO planned prefeasibility studies on the Border, Karadori, Mabil, and Mendaia hydroelectric projects in 2004 (Africa Energy Intelligence, 2002; African Energy, 2003).

Ethiopia's geothermal resources have been estimated to be more than 1,000 MW, which included 170 MW in the Lakes District. EEPKO operated the 7.3-MW-capacity Aluto-Langano geothermal plant in the Lakes District. The plant did not produce in fiscal year 2002-03 because of low pressure and a lack of spare parts (Business Council for Sustainable Energy, 2003, p. 64, 67-69).

At the end of 2001, Ethiopia's transportation network comprised 30,871 km of roads, of which 3,924 km was paved. The Ethiopian segment of the Addis Ababa-Djibouti railroad was 681 km.

## Outlook

According to predictions by the International Monetary Fund (2004, p. 194), the GDP would rise by 6.7% in 2004 and 6.4% in 2005. Ethiopia's plans to expand and upgrade infrastructure may increase the economic viability of its metals and industrial minerals deposits. The outlook for columbium (niobium), gold, and tantalum depends primarily on world market conditions. The outlook for such construction materials as cement, brick clay, limestone, and sand and gravel depends upon the strength of the domestic economy.

Production of other mineral commodities faces a variety of constraints. In recent years, domestic output of kaolin and sulfuric acid has been inhibited by limited domestic demand; caustic soda, by import competition and shortages of lime needed as raw material; and silica sand, by the capacity of the country's only glass and bottle factory (Ethiopia Ministry of Mines, 2002, p. 14-16; U.S. State Department, undated§).

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## SOMALIA

Somalia is an East African country on the Gulf of Aden and the Indian Ocean that produced small quantities of gypsum, salt, and sepiolite (meerschaum) in 2003. Recent discoveries and artisanal mining of gemstones included amethyst, aquamarine, emerald, garnet, sapphire, and zircon. The country also had deposits of feldspar, iron ore, kaolin, limestone, natural gas, quartz, silica sand, tantalum, tin, and uranium (tables 1, 3). The minerals industry made a small contribution to Somalia's exports and the economy in general.

Officially reported mineral and trade data have been unavailable because of the lack of a central Government from 1991 to 2000 and the ongoing conflict that has pervaded most of Somalia. Somaliland (a region in northern Somalia) declared its independence in 1991, and Puntland (which was to the east of Somaliland) declared autonomy in 1998. The Rahanwayn Resistance Army (RRA), which controlled much of the Bay and Bakol regions in southwestern Somalia, declared independence in 2002 (United Nations Integrated Regional Information Networks, 2003a, f). None of the declarations of independence have been internationally recognized. Somalia's civil war has had considerable adverse consequences for the economy, which included the minerals sector. The war forced the closure of Somalia's cement plant and oil refinery and halted most exploration for mineral resources.

Conflict continued in many areas in Somalia in 2003. In early 2003, rival militias fought in Mogadishu and in the Bari, Bay, Bakol, Gedo, and Lower Shabelle regions. As of October, rival factions of the RRA were fighting in Baidoa. Interclan conflict in the Galgaduud region continued through December. In May, the authorities of Puntland signed a peace agreement with internal opposition forces. Puntland and Somaliland, however, were in conflict in the Sool region by late December (United Nations Integrated Regional Information Networks, 2003a, c-f).

In February 2003, the authorities of Somaliland awarded a prospecting license for tantalite in the Henweina Valley to a Djibouti-based company. Resources of tantalum in Puntland were estimated to be 1.6 Mt and to contain about 230 t of tantalum (table 3; Blackburn, 2003).

Somalia imported all its cement, most of which was believed to be sourced from Jordan, Kenya, and Saudi Arabia. Domestic cement consumption was expected to remain unchanged at 100,000 t in 2003. The Berbera cement plant had a capacity of 200,000 t/yr, but needed substantial upgrade work to resume production (International Cement Review, 2003).

Such gemstones as aquamarine, emerald, garnet, opal, red spinel, ruby, sapphire, and tourmaline were produced in Somaliland. Mining of Somaliland's gemstones has been limited by civil strife, damaged infrastructure, and a lack of modern equipment. Garnet and opal accounted for the largest shares of gemstone production. The production of emerald was recently estimated to be several thousand carats per year; ruby and sapphire production was not estimated to be significant (Dr. Judith Kinnaird, Senior Research Fellow, School of Geosciences, University of the Witwatersrand, written commun., July 10, 2003).

Since the closure of Somalia's oil refinery in 1991, the country's demand for petroleum products has been met through imports. Somalia's energy sector also faced the problem of deforestation. Charcoal was the primary domestic source of energy and one of the country's largest exports. In 1992, the United Nations estimated that 14% of Somalia was covered with woodland; this figure may have fallen to as low as 4% by 2002. In 2002, exports of charcoal to countries in the Persian Gulf region were estimated to be 750,000 t. Charcoal exports accounted for 48% of deforestation in 2002; fuel wood for local use, 28%; and other factors, 24% (Lacey, 2002; Adan, undated).

Somalia's installed electricity-generating capacity amounted to 70 MW, all of which was diesel fired. Ente Nazionale Energia Elettrica of Italy was responsible for the generation, transmission, and distribution of electricity (U.S. Energy Information Administration, 2003§).

Somalia's transportation network comprised about 22,000 km of roads, of which 2,600 km was paved. Oil pipelines totaled 15 km. Ports and harbors were Bender Cassim (Boosaaso), Berbera, Chisimayu (Kismaayo), Merca, and Mogadishu.

The outlook for Somalia's mineral industry is for little change in the short run. In 2003, the Transitional National Government controlled only portions of Mogadishu and other pockets of territory. At the end of 2003, Somalia faced numerous internal conflicts that included the dispute between Puntland and Somaliland over the Sanaag and Sool regions. In January 2004, Somali leaders planned to meet in Kenya to further the peace process (United Nations Integrated Regional Information Networks, 2003b, f).

Other problems include weak infrastructure and a domestic market that is limited by severe poverty. In the long run, an end to the civil war; investment in education, health, and infrastructure; favorable world market conditions; improvements in mining technology; and other conditions amenable to private foreign investment could lead to greater development of Somalia's mineral resources.

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TABLE 1  
DJIBOUTI, ERITREA, ETHIOPIA, AND SOMALIA: PRODUCTION OF MINERAL COMMODITIES <sup>1</sup>

(Metric tons unless otherwise specified)

Country and commodity	1999	2000	2001 <sup>c</sup>	2002 <sup>c</sup>	2003 <sup>c</sup>
<b>DJIBOUTI</b>					
Salt	127,283	135,933	173,099 <sup>2</sup>	162,266 <sup>2</sup>	163,000
<b>ERITREA</b>					
Basalt	251,991	122,928	161,759 <sup>2</sup>	148,424 <sup>2</sup>	149,000
Cement <sup>c</sup>	45,000	45,000	45,000	45,000	45,000
Clays:					
Common	88,476 <sup>2</sup>	63,427 <sup>2</sup>	282,518 <sup>2</sup>	225,504 <sup>2</sup>	226,000
Kaolin	1,138	943	588 <sup>2</sup>	250 <sup>2</sup>	250
Coral	86,762	74,130	38,596 <sup>2</sup>	49,297 <sup>2</sup>	50,000
Gold kilograms	534	264	107 <sup>2</sup>	-- <sup>2</sup>	--
Granite	162,146	122,017	145,193 <sup>2</sup>	150,053 <sup>2</sup>	151,000
Gravel	1,215,579	113,769	339,692 <sup>2</sup>	220,928 <sup>2</sup>	221,000
Gypsum	1,075	330	985 <sup>2</sup>	504 <sup>2</sup>	510
Laterite	2,171	2,049	3,575 <sup>2</sup>	5,200 <sup>2</sup>	5,200
Lime <sup>c</sup>	40,000	40,000	42,610 <sup>2</sup>	47,406 <sup>2</sup>	47,500
Limestone <sup>3</sup>	5,069	2,690	2,830	2,900	2,900
Marble blocks square meters	NA	1,990	17,656 <sup>2</sup>	12,851 <sup>2</sup>	12,900
Pumice	153	41	195 <sup>2</sup>	212 <sup>2</sup>	220
Quartz	730 <sup>e</sup>	600 <sup>e</sup>	350 <sup>2</sup>	215 <sup>2</sup>	220
Salt	9,368	47,498	77,853 <sup>2</sup>	116,268 <sup>2</sup>	117,000
Sand thousand tons	466	593	685 <sup>2</sup>	605 <sup>2</sup>	610
Silica sand	5,795	--	-- <sup>2</sup>	36 <sup>2</sup>	40
<b>ETHIOPIA <sup>4,5</sup></b>					
Cement, hydraulic	638,266	879,962	900,000 <sup>r,2</sup>	900,000 <sup>r,2</sup>	1,200,000
Clays: <sup>6</sup>					
Brick	80,865 <sup>2</sup>	224,093 <sup>2</sup>	242,000	242,000	242,000
Kaolin, China clay	681	1,654	1,800 <sup>r</sup>	1,800	1,800
Other clay cubic meters	23,750	23,000 <sup>e</sup>	25,000 <sup>r</sup>	25,000	25,000
<b>Columbite-tantalite, ore and concentrate:</b>					
Gross weight kilograms	49,630	64,940	78,700	61,000	61,000
Nb content do.	4,960	6,490	7,900 <sup>r</sup>	6,100	6,100
Ta content do.	29,300	38,800	47,000 <sup>2</sup>	37,000	37,000
Diatomite	140	140 <sup>e</sup>	1,500	1,500	1,500
Feldspar	391	285	310	310	310
Gold, mine output, Au content kilograms	4,905	5,177	5,200	5,300	5,300
Gypsum and anhydrite, crude	35,983	46,798	51,000 <sup>r</sup>	51,000	62,000
Lime	2,991	3,769	3,800	3,800	3,800
Pumice <sup>6</sup>	135,400	156,466	169,000	170,000	170,000
Salt, rock	56,400	56,400	61,000 <sup>r</sup>	61,000	61,000
Scoria <sup>c</sup>	281,164 <sup>2</sup>	287,000	310,000	310,000	310,000
Silver, mine output, Au content kilograms	689	1,018	1,051 <sup>2</sup>	1,100	1,100
Soda ash, natural	4,409	3,805	7,543 <sup>2</sup>	7,600	7,600
<b>Stone, sand and gravel:<sup>c,6</sup></b>					
Construction stone, crushed thousand tons	3,407 <sup>2</sup>	3,459 <sup>2</sup>	3,740	3,800	3,800
Dimension stone <sup>7</sup>	130,000	100,000	108,000	108,000	108,000
Granite	126 <sup>2</sup>	140	150	150	150
Limestone thousand tons	846 <sup>2</sup>	1,197 <sup>2</sup>	1,300	1,300	1,300
Sand <sup>8</sup> do.	1,600 <sup>2</sup>	1,853 <sup>2</sup>	2,000	2,000	2,000
Silica sand	6,061 <sup>2</sup>	5,601 <sup>2</sup>	6,000	6,000	6,000
Other stone	10,162 <sup>2</sup>	15,768 <sup>2</sup>	17,000	17,000	17,000
<b>SOMALIA<sup>c,9</sup></b>					
Gypsum	1,500	1,500	1,500	1,500	1,500
Salt, marine	1,000	1,000	1,000	1,000	1,000
Sepiolite, meerschaum	6	6	6	6	6

See footnotes at end of table.



TABLE 1--Continued  
DJIBOUTI, ERITREA, ETHIOPIA, AND SOMALIA: PRODUCTION OF MINERAL COMMODITIES <sup>1</sup>

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<sup>6</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>7</sup>Revised. NA Not available. -- Zero.

<sup>1</sup>Includes data available through May 10, 2004.

<sup>2</sup>Reported figure.

<sup>3</sup>For other than cement.

<sup>4</sup>Data are for year ending July 7 of the year listed.

<sup>5</sup>In addition to the commodities listed, some lignite, semiprecious gemstones, crude and semimanufactured steel, sulfuric acid, and talc reportedly were produced, and platinum was reportedly contained in gold ingots from the Lega Dembi Mine, but information is inadequate to estimate output.

<sup>6</sup>When reported as volume or pieces, conversions to metric tons are estimated.

<sup>7</sup>Includes marble. Production of marble was reported to be 6,014 t in 1999 and 6,662 t in 2000.

<sup>8</sup>May include gravel.

<sup>9</sup>In addition to the commodities listed, precious and semiprecious gemstones were reportedly produced, and various crude construction materials (for example, clays, sand and gravel, crushed and dimension stone) and lime are presumably produced, but information is inadequate estimate output.

TABLE 2  
ERITREA, ETHIOPIA, AND SOMALIA: STRUCTURE OF THE MINERAL INDUSTRIES IN 2003

(Metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
<b>ERITREA</b>				
Cement		Eritrea Cement Works	Massawa	45,000 cement; 45,000 clinker.
Petroleum products <sup>1</sup>	thousand barrels	Petroleum Corp. of Eritrea	Assab	5,320.
<b>ETHIOPIA</b>				
Caustic soda		Abiyata Soda Ash Enterprise (Government-owned)	Ziway	10,000.
Cement		Messebo Building Materials Production Share Co. (Government-owned)	Mekele	640,000 cement; 600,000 clinker.
Do.		Mugher Cement Enterprise (Government-owned)	Mugher	720,000 cement; 620,000 clinker.
Do.		do.	Addis Ababa	125,000 cement; 112,000 clinker.
Do.		do.	Dire Dawa	32,000 cement; 24,000 clinker.
Columbium (niobium) and tantalum	kilograms	Ethiopian Mineral Resources Development Enterprise (EMRDE) [Government-owned]	Kenticha Mine near Borena	112,000 tantalum. <sup>c</sup>
Glass		Addis Ababa Bottle and Glass Share Company	Addis Ababa	8,000.
Gold		Midroc Gold (subsidiary of Midroc Ethiopia Group)	Lega Dembi	1,500,000 ore processing.
Do.	kilograms	do.	do.	4,000 gold.
Kaolin		Ethiopian Mineral Resources Development Enterprise	Bamba Wuha	15,000.
Marble <sup>2</sup>		Ethiopian Marble Industries	Harar and various sites in western Ethiopia	NA.
Do.		National Mining Corp. (subsidiary of Midroc Ethiopia Ltd.)	Mugher	NA.
Do.		Saba Stones	Tigre Province	NA.
Soda ash		Abiyata Soda Ash Enterprise	Lake Abiyata	20,000. <sup>c</sup>
<b>Steel:</b>				
Crude		Ethiopia Iron and Steel Factory	Akaki	NA.
Semimanufactured		do.	do.	12,000.
Do.		Zuquala Steel Rolling Mill Enterprise (Government-owned)	Debre Zeit	100,000.
Galvanized		Akaki Metal Products Factory	Akaki	NA.
Sulfuric acid		Melkasa Aluminum Sulfate and Sulfuric Acid Factory	Melkasa	NA.
<b>SOMALIA</b>				
Cement <sup>3</sup>		Berbera Cement Agency	Berbera	200,000 cement; 200,000 clinker.
Petroleum products <sup>4</sup>	thousand barrels	Iraqsoma Refinery Co.	Mogadishu	3,650.

<sup>c</sup>Estimated. NA Not available.

<sup>1</sup>Has not operated since 1997.

<sup>2</sup>National capacity of marble is estimated to be at least 6,700 t/yr based on recent production data.

<sup>3</sup>Has not operated since 1996.

<sup>4</sup>Has not operated since 1991.

TABLE 3  
ERITREA, ETHIOPIA, AND SOMALIA: MINERAL RESOURCES IN 2003

Commodity	Deposit	Tonnage <sup>1</sup>	Grade <sup>2</sup>	Mineral content <sup>1-3</sup>
<b>ERITREA</b>				
Copper and gold <sup>4,5</sup>	Debarwa:			
	Main and Footwall Zones	1.65 Mt	5.1% Cu; 1.4 g/t Au	84,000 t Cu; 2,300 kg Au.
Do.	Leached Zone	0.47 Mt	7.07 g/t Au	3,300 kg Au.
Gold <sup>5</sup>	Adi Nefas Doop	2.92 Mt	3.1 g/t Au	9,100 kg Au.
Zinc, copper, gold, and silver <sup>5</sup>	Emba Derho	2.59 Mt	2.36% Zn; 0.39% Cu; 0.1 g/t Au; 4.5 g/t Ag	61,000 t Zn; 10,000 t Cu; 260 kg Au; 12,000 kg Ag.
Do. <sup>5</sup>	Adi Nefas	1.43 Mt	9.3% Zn; 0.95% Cu; 3.28 g/t Au; 129 g/t Ag	130,000 t Zn; 14,000 t Cu; 4,700 kg Au; 184,000 kg Ag.
<b>ETHIOPIA</b>				
Diatomite	Lakes Region, Shewa and Arsi Provinces	NA	NA	85 Mt.
Dolomite	Galleti	NA	NA	1.4 Mt.
Do.	Hula-Kuni	NA	NA	250,000 t.
Feldspar	Kenticha	1.14 Mt	40% feldspar	500,000 t.
Do.	Babile-Bombas	0.3 Mt	50% feldspar	150,000 t.
Gold	Lega Dembi	NA	NA	83,000 kg.
Do.	Adola	NA	NA	4,500 kg.
Gypsum	Sodoble	NA	NA	56 Mt.
Do.	Adigudom	NA	NA	400,000 t.
Kaolin	Bombowha	1 Mt	30% kaolin	300,000 t.
Do.	Kombelcha	0.96 Mt	31% kaolin	300,000 t.
Limestone	Mossobo	NA	NA	69.5 Mt.
Do.	Mugher	NA	NA	50 Mt.
Do.	Dire Dawa	NA	NA	46 Mt.
Marble	Mora	NA	NA	46.5 Mt.
Do.	Baruda	NA	NA	13.6 Mt.
Natural gas	Calub	25 billion cubic meters	NA	NA.
Peridot	Bulgendo	NA	NA	2,457 kg.
Salt	Denkali depression	NA	NA	3,000 Mt.
Do.	Lake Afdera	NA	NA	290 Mt.
Silica sand	Mugher	NA	NA	3.4 Mt.
Soda ash	Lakes Abiyata, Chiltu, and Shala	NA	1.1% to 1.9% Na <sub>2</sub> CO <sub>3</sub>	460 Mt.
Talc	Anno	NA	NA	120,000 t.
<b>SOMALIA</b>				
Gypsum and anhydrite	Suria Malableh	5 Mt	80% gypsum	4 Mt.
Do.	do.	2.5 Mt	90% anhydrite	2.3 Mt.
Sepiolite	Indho Qabyo	20 Mt	NA	NA.
Do.	Other deposits in El Bur area	80 Mt	NA	NA.

NA Not available.

<sup>1</sup>Mt--million metric tons.

<sup>2</sup>Ag--silver; Au--gold; Cu--copper; Na<sub>2</sub>CO<sub>3</sub>--sodium carbonate (soda ash); Zn--zinc; g/t--gram per metric ton.

<sup>3</sup>kg--kilograms; t--metric tons.

<sup>4</sup>Sub-Sahara Resources NL reported that additional resources at Debarwa were 1.3 Mt; grades were not available.

<sup>5</sup>Sub-Sahara indicated that these resource estimates were not in compliance with the standards set by the Australasian Joint Ore Reserves Committee; readers are advised to treat these estimates with caution.

Sources: Chakrabarti, A.K., 1988, An appraisal of the mineral resource potential of the Somali Democratic Republic: Mogadishu, Somalia, United Nations Revolving Fund for Natural Resource Exploration, 230 p.; Mengistu, Tabetu, and Fentaw, H.M., 2000, The industrial mineral and rock resource potential of Ethiopia: Chronicle of Mineral Research & Exploration, no. 540, September, p. 33-40; Radler, Marilyn, 2002, Worldwide reserves increase as production holds steady: Oil & Gas Journal, v. 100, no. 52, December 23, p. 113-145; Ethiopia Ministry of Mines, 2002, Opportunities for investment in Ethiopia's industrial minerals: Addis Ababa, Ethiopia, Ethiopia Ministry of Mines, 19 p.; Ethiopia Ministry of Mines, 2002, Opportunities for investment in Ethiopia's gemstones: Addis Ababa, Ethiopia, Ethiopia Ministry of Mines, 8 p.; Mining Journal, 2002, Ethiopia supplement: Mining Journal, v. 338, no. 8689, June 14, 12 p.; Sub-Sahara Resources NL, 2002, Annual report 2002: Perth, Australia, Sub-Sahara Resources NL, 49 p.